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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,388	09/11/2003	Min Chu	M61.12-0520	6935
27366 7590 06/12/2007 WESTMAN CHAMPLIN (MICROSOFT CORPORATION) SUITE 1400 900 SECOND AVENUE SOUTH MINNEAPOLIS, MN 55402-3319			EXAMINER SKED, MATTHEW J	
			ART UNIT 2626	PAPER NUMBER
			MAIL DATE 06/12/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/660,388	Applicant(s) CHU ET AL.	
	Examiner Matthew J. Sked	Art Unit 2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 3-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Chu et al. ("A Objective Measure for Estimating MOS of Synthesized Speech"), cited by Applicant.

As per claim 1, Chu teaches a method for optimizing an objective measure, from which naturalness of synthesized speech can be estimated, wherein naturalness is a subjective quality of synthesized speech, the method comprising:

generating a set of synthesized utterances (generates waveforms by TTS, section 3.1);

subjectively rating each of the synthesized utterances (MOS calculated from subjective ratings, section 3.1);

calculating a score for each of the synthesized utterances using an objective measure, the objective measure being a function of textual information derived from the utterances (calculates the average concatenative cost based upon the position of words in the corpus, section 2);

ascertaining a relationship between the scores of the objective measure and subjective ratings of the synthesized utterances (calculates the correlation coefficient, section 3.2); and

altering the objective measure to provide a different function of textual information derived from the utterances so as to improve the relationship between the scores of the objective measure and subjective ratings of the synthesized utterances (weights of the average concatenative cost are optimized, section 3.4).

3. As per claims 3 and 5, Chu teaches wherein the objective measure includes components having categorical values and wherein a distance between categories are empirically defined as values in distance tables and wherein altering includes altering the values in distance tables (the objective measure includes categorical values and distances between categories, section 2).

4. As per claims 4 and 9-20, Chu teaches wherein the objective measure comprises one or more first order components from a set of factors and/or one or more higher order components being combinations of at least two factors from the set of factors, wherein the set of factors include: an indication of a position of a speech unit in a phrase; an indication of a position of a speech unit in a word; an indication of a category for a phoneme preceding a speech unit; an indication of a category for a phoneme following a speech unit; an indication of a category for tonal identity of the current speech unit; an indication of a category for tonal identity of a preceding speech unit; an indication of a category for tonal identity of a following speech unit; and an indication of a level of stress of a speech unit; an indication of a coupling degree of

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pitch, duration and/or energy with a neighboring unit; and an indication of a degree of spectral mismatch with a neighboring speech unit (factors include position in phrase, position in word, left and right phonetic context, right and left tone context and smoothness, section 2).

5. As per claim 6, Chu teaches wherein components of the objective measure each include a weighting value and wherein altering includes altering the weighting values (weights of the average concatenative cost are optimized, section 3.4).

6. As per claim 7, Chu teaches wherein altering the objective measure comprises selecting components of the objective measure as a function of the weighting factor of each component (larger weights cause different components to be more prominent in the calculation hence selecting the component, see section 2).

7. As per claim 8, Chu teaches wherein altering the objective measure comprises selecting components of the objective measure as a function of its respective correlation to the subjective ratings of the synthesized utterances (larger weights cause different components to be more prominent in the calculation hence selecting the component wherein the weights are optimized based upon the correlation coefficient, see sections 2 and 3.4).

8. As per claim 21, Chu teaches a method for optimizing an objective measure, from which naturalness of synthesized speech can be estimated, wherein naturalness is a subjective quality of synthesized speech, the method comprising:

generating a set of synthesized utterances (generates waveforms by TTS, section 3.1);

subjectively rating each of the synthesized utterances (MOS calculated from subjective ratings, section 3.1);

calculating a score for each of the synthesized utterances using an objective measure, the objective measure being a function of textual information derived from the speech units used in the utterances and the objective measure comprising components being based on single-order textual features or a combination of at least two single-order textual features, the components having categorical values, wherein a distance between categories are empirically defined as values in distance tables, the components further having a weighting value (calculates the average concatenative cost based upon the position of words in the corpus, the objective measure includes categorical values, weights and distances between categories, section 2);

ascertaining a relationship between the scores of the objective measure and subjective ratings of the synthesized utterances (calculates the correlation coefficient, section 3.2); and

altering the objective measure to provide a different function of textual information derived from the utterances so as to improve the relationship between the scores of the objective measure and subjective ratings of the synthesized utterances, wherein altering comprises altering the values in the distance tables followed by altering the weighting values (weights of the average concatenative cost are optimized, section 3.4).

9. As per claims 22 and 23, Chu teaches wherein altering the objective measure comprises selecting components of the objective measure as a function of the weighting

factor of each component (larger weights cause different components to be more prominent in the calculation hence selecting the component, see section 2).

10. As per claim 24, Chu teaches wherein altering the objective measure comprises selecting components of the objective measure as a function of its respective correlation to the subjective ratings of the synthesized utterances (larger weights cause different components to be more prominent in the calculation hence selecting the component wherein the weights are optimized based upon the correlation coefficient, see sections 2 and 3.4).

11. As per claim 25, Chu teaches wherein the objective measure comprises one or more first order components from a set of factors and/or one or more higher order components being combinations of at least two factors from the set of factors, wherein the set of factors include: an indication of a position of a speech unit in a phrase; an indication of a position of a speech unit in a word; an indication of a category for a phoneme preceding a speech unit; an indication of a category for a phoneme following a speech unit; an indication of a category for tonal identity of the current speech unit; an indication of a category for tonal identity of a preceding speech unit; an indication of a category for tonal identity of a following speech unit; and an indication of a level of stress of a speech unit; an indication of a coupling degree of pitch, duration and/or energy with a neighboring unit; and an indication of a degree of spectral mismatch with a neighboring speech unit (factors include position in phrase, position in word, left and right phonetic context, right and left tone context and smoothness, section 2).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chu in view of Ghitza et al. (U.S. Pat. 6,609,092), cited by Applicant.

14. As per claim 2, Chu does not teach wherein the step of altering is repeated, and wherein each repetition includes using the same subjective ratings of the synthesized utterances and textual information of the synthesized utterances

Ghitza teaches wherein the step of altering is repeated, and wherein each repetition includes using the same subjective ratings of the synthesized utterances and textual information of the synthesized utterances (operations are repeated for each of the N sets using the same subjective results, col. 2, line 61 to col. 3, line 8).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Chu to repeat the step of altering and wherein each repetition includes using the same subjective ratings of the synthesized utterances and textual information of the synthesized utterances as taught by Ghitza because it would give a more precise derivation of the proper weights used in the calculation.


Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Conway (U.S. Pat. 6,965,597) teaches altering an objective measure based on a comparison of the objective measure and a subjective measure. Rix et al. (U.S. Pat. 7,050,924) teaches a system for calculation an objective measure for speech.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Sked whose telephone number is (571) 272-7627. The examiner can normally be reached on Mon-Fri (8:00 am - 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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